Classification [redacted]

TO

By Authority of

ATG ---- AUG 25 1971

Name Title Date

Distribution List

1. K. Z. Morgan
2. K. Z. Morgan
3. J. S. Felton
4. W. H. Ray
5. H. R. Craft
6. ~~C. File~~
7. R. File

To: K. Z. Morgan 10/11/46

From: H. R. Craft

In Re: Annual Mud Survey - 1946.

CLINTON LABORATORIES
CENTRAL FILES NUMBER
46-10-403

White Oak Creek Drainage System:

Before going into details of mud sampling of the surface fission product contamination from Clinton Laboratories, it will be advisable to review briefly the extent of the White Oak Creek Drainage System. This system shown on the attached map starts at the Settling Basin where the overflow of this basin empties into a ditch which was widened and deepened from White Oak Creek. From here the water flows along the creek bed into a marsh, created by placing a dike across the stream. The end of this marsh is approximately 2000 feet beyond the dike, consequently affording a large area for filtering and settling to occur. This area is found to contain highly contaminated mud with a range of 10 to 15 times as much activity as is found in other areas farther on in the drainage system.

The Intermediate Pond is located at the terminus of the Marsh. This pond gives the active mud another chance to settle on its course to White Oak Lake.

The area north of the lake, between this body of water and the Intermediate Pond, is known as the Mud Flats, and has been exposed during the first 10 months of 1946, because the dam has been kept at a low water level during this time.

The mud has another chance to settle in White Oak Lake, before the water flows under the road where it follows the stream bed to the Clinch River. All the above place names can be found on the attached map of the total drainage system area.

The present survey of the drainage system shows an average of 142.52 μc/sq.ft. in the Marsh Section, 9.6 μc/sq.ft. in the Mud Flats, 17.12 μc/sq.ft. in White Oak Lake, and 2.69 μc/sq.ft. in the area immediately below the spillway. This is equivalent to a total of 88.76 curies for an estimated 2,241,000 sq. ft. of territory.

This document contains information affecting the national [redacted] Act, U.S.C. 50, 31 and 32. Its transmission or the revelation [redacted] is prohibited by law.

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Stratification:

As was done in 1945 by L. H. Weeks*, preliminary surveys of the depth of activity were made to facilitate in taking samples to the proper depth. This survey was made in the Intermediate Pond. The results (attached tables) show that activity is found at depths as great as 14 inches. Of course, the core sampler could be used to better advantage in the Intermediate Pond as the mud deposits are quite soft and easily penetrable to greater depths than in other areas.

For this reason, the stratification sampling in this survey serves no real purpose, except as it induces the surveyors to penetrate the mud until the sampler strikes solid ground at which point it is withdrawn and the core measured for length. This procedure was followed throughout the survey.

It can be stated with a certain degree of certainty, however, that most of the activity is contained in the top 7 or 8 inches of mud where such deep samples can be taken. Moreover, the greatest activity is noted at the top with a decreasing level of activity toward the bottom of the core. It should also be noted that activity detected at depths as great as 14 inches might well be attributed to contamination from the top of the core.

Sampling:

A sampler with a 2" inside diameter was used in taking the cores of mud. In the case of the Intermediate Pond the entire core was sampled at various depths from top to bottom, but for other areas the stratification was destroyed which distributed the contamination evenly throughout the mud. The stratification was destroyed only after approximately 1/3 of the core was sliced off, lengthwise, to reduce the quantity of mud to be counted, and to facilitate the handling thereof.

The following self-explanatory method of computation was employed to ascertain the data desired, namely, μc/sq.ft. of mud: Wet weight of core, wet weight of representative sample, weight of H_2O in representative sample, % of H_2O in representative sample, and weight of H_2O in core.

* Report "Assay of Fission Product Contamination in the Mud of the White Oak Drainage System", L. H. Weeks to K. Z. Morgan 5/9/45.

[redacted] contains information affecting the National defense of the U.S. within the meaning of the Espionage Act, U.S.C. 50, 31, and [redacted] its transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law.

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Small samples, 1 to 3 grams, of the representative mixture were counted, and ~~4~~ c/gm of mud were ascertained, corrected for self-absorption. From the ~~4~~ c/gm, the ~~4~~ c/core were found, and finally the ~~4~~ c/sq.ft. (M. A. Buford was in charge of this phase of the project, assisting also in abstersion, weighing, drying, and counting samples.)

Stadia Survey:

The civil engineering survey (done by D. A. Parker with the assistance of H.R. Craft) consists of the use of a transit, a stadia rod, a 100 foot measuring tape, and two range rods.

Very few of the control stations located on the maps drawn by J. W. Minter in May, 1945, could be found, so new stations were set up and all sampling points made with reference to the new stations. New maps were accordingly drawn. (attached)

References:

Area Survey:	See Secret Note Books	CLA-235	p 48 ff.
		CLA-415	p 94 ff.

Sampling Points: See Secret Note Book CLA-235

Counting of Samples: See Secret Note Book CL-878

Computation of Samples: See Secret Note Book CL-878.

H. R. Craft

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STRATIFICATION

INTERMEDIATE POND

Distance from top of core (in.)	Sample No. - μc/gm				
	1	2	3	4	5
Top	5.73×10^{-3}	6.42×10^{-4}	6.1×10^{-3}	5.64×10^{-3}	3.49×10^{-3}
1	N*	4.38×10^{-4}	N	N	N
2	1.69×10^{-3}	2.15×10^{-4}	1.97×10^{-3}	4.13×10^{-3}	1.67×10^{-3}
3	N	1.34×10^{-4}	N	N	N
4	5.83×10^{-4}	2.99×10^{-4}	1.78×10^{-3}	2.25×10^{-3}	1.69×10^{-3}
6	3.34×10^{-4}	N	3.1×10^{-3}	1.25×10^{-3}	4.86×10^{-5}
8	3.64×10^{-3}		3.82×10^{-3}	2.29×10^{-3}	0
10	N		0	1.63×10^{-3}	
12				3.9×10^{-3}	
14				2.87×10^{-4}	
				N	

Locations - See attached map

*N = No sampling taken.

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MARSH SECTION

Sample	Approx. Depth Inches	μc/sq.ft.	Cross-section Average
MA 3	10	261	
MA 1	12	307.1	197.75
MA 2	7.0	88.4	
MA 4	9.0	140.5	
MA 5	8.5	187	
MA 6	9.0	129.5	
MA 7	6.5	132.8	
MA 8	5.5	23.4	
MA 9	6.0	86.2	68.45
MA 10	3.5	51.7	
MA 11	8	199	
MA 12	8.5	145.5	
MA 13	7.5	175	
MA 14	6.0	189	
MA 15	7.0	105.8	
MA 16	6.0	219	168.25
MA 21	8.0	117.5	
MA 17	8.0	81.5	78.35
MA 20	5.0	75.2	
MA 18	11	209	171
MA 19	10	133	

Av. 145.52 μc/sq.ft.
Area 466,000 sq.ft.
Total curies = 67.8

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WHITE OAK LAKE

Sample	Approx. Depth Inches	μc/sq.ft.	Cross-section Average
L 3	6.5	20.9	
L 4	3	14.5	17.7
L 5	5.6	8.4	
L 2	5	16.0	12.2
L 1	6	26.3	
L 6	3.5	14.7	20.5
L 7	6	9.3	
L 8	3.8	26.5	15.53
L 9	3	10.8	
L 10	6.3	25.7	
L 11	6	6.8	
L 12	4.9	24.1	
L 13	3	29.1	26.8
L 14	4	25.7	
L 15	4.5	12.8	19.25
L 16	5.2	2.9	
L 17	3	18.5	10.7
L 18	3	14.2	
L 19	5	4.8	10.86
L 20	3	13.6	
L 21	4	14.8	
L 23	5	11.2	13.0
L 22	4.2	42.2	

Av. 17.12 μc/sq.ft.
Area 795,000 sq.ft.
Total curies = 13.6

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WHITE OAK LAKE MUD FLATS

Sample	Approx. Depth Inches	μc/sq.ft.	Cross-section Average
M 9	8	9.59	
M 8	6	7.8	23.5
M 1	6	53.1	
M 10	8	9.26	
M 12	6.5	13.4	11.3
M 11	7	7.21	
M 2	6.5	7.8	
M 3	3.5	1.84	
1018	3	4.96	
M 4	4	1.53	
M 5	2.7	2.75	
1017	2	8.25	
M 6	2	.823	
M 7	4	4.55	
1019	6	11.2	

Av. 9.6 μc/sq.ft.
Area 680,000 sq.ft.
Total curies = 6.5

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AREA BELOW SPILLWAY SAMPLES

Sample	Approx. Depth Inches	µµ c/sq.ft.	Cross-section Average
S 1	3	6.83	3.90
S 2	3.5	.962	
S 3	4	7.43	4.7
S 4	2	1.97	
S 5	3	2.34	2.7
S 6	4	2.98	
S 7	3	0	
S 8	3	.229	
S 9	3	6.47	4.0
S 10	2	1.61	
S 11	3	6.46	4.7
S 12	4	2.88	
S 13	2.5	2.79	2.1
S 14	3	1.37	
S 15	1.5	.596	
S 16	1.7	0	
S 17	1.5	.960	

Av. 2.69 µµ c/sq.ft.
Area 300,000 sq.ft.
Total curies = .86

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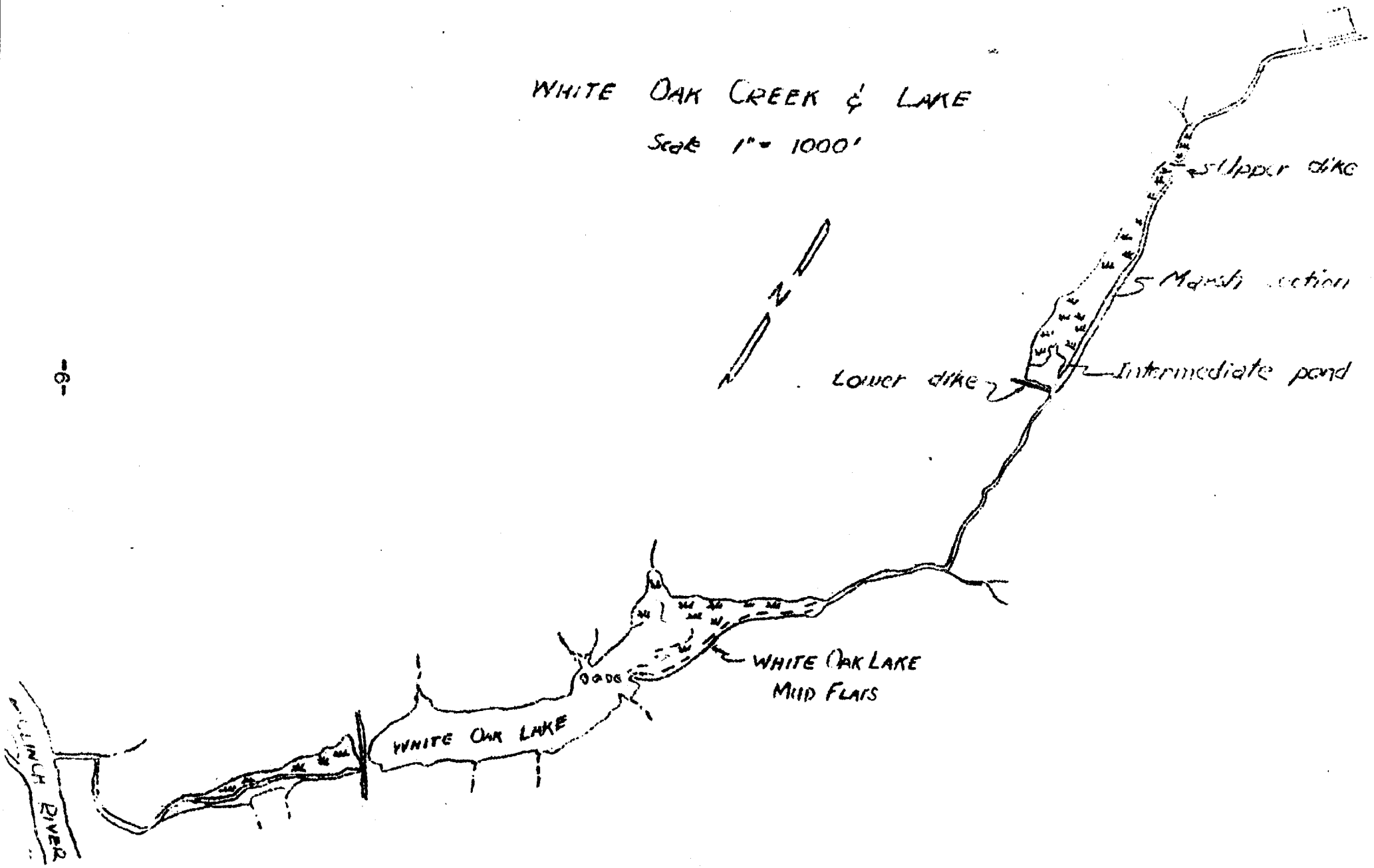
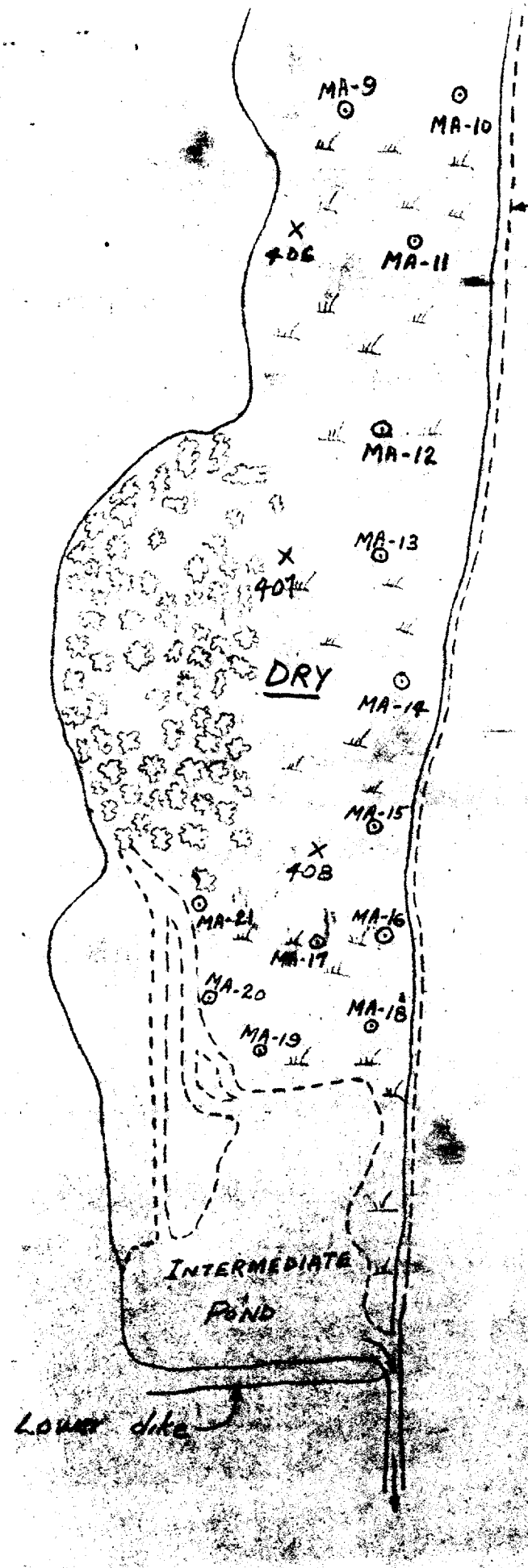

WHITE OAK CREEK & LAKE
Scale 1" = 1000'
Upper dike
Marsh section
Intermediate pond
Lower dike
WHITE OAK LAKE
MUD FLATS
WHITE OAK LAKE
CLINCH RIVER



SAMPLING POINTS SHOWN AS: ⊙

CONTROL POINTS SHOWN AS: X

MARSH SECTION OF WHITE OAK CREEK

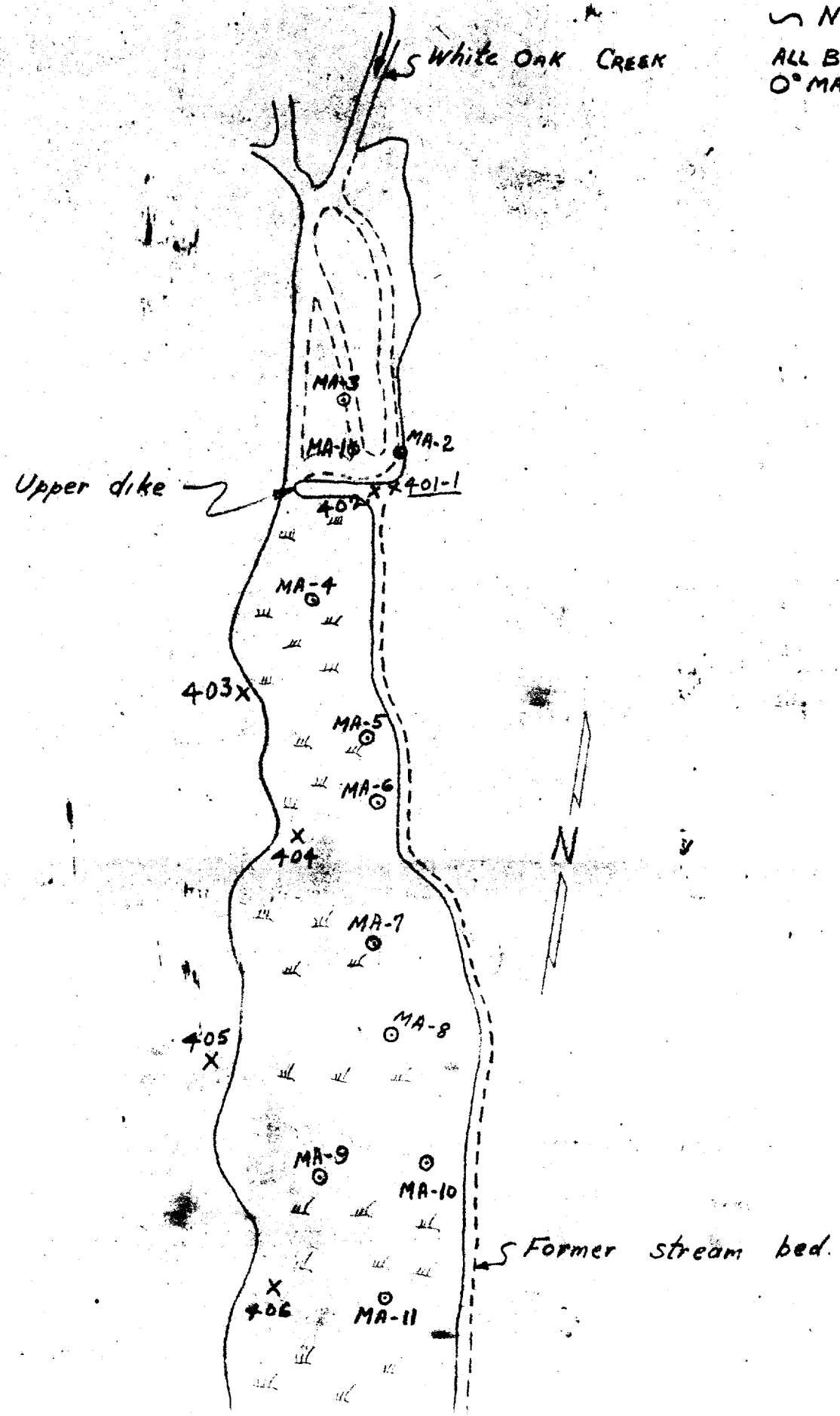
SCALE: 1" = 150'

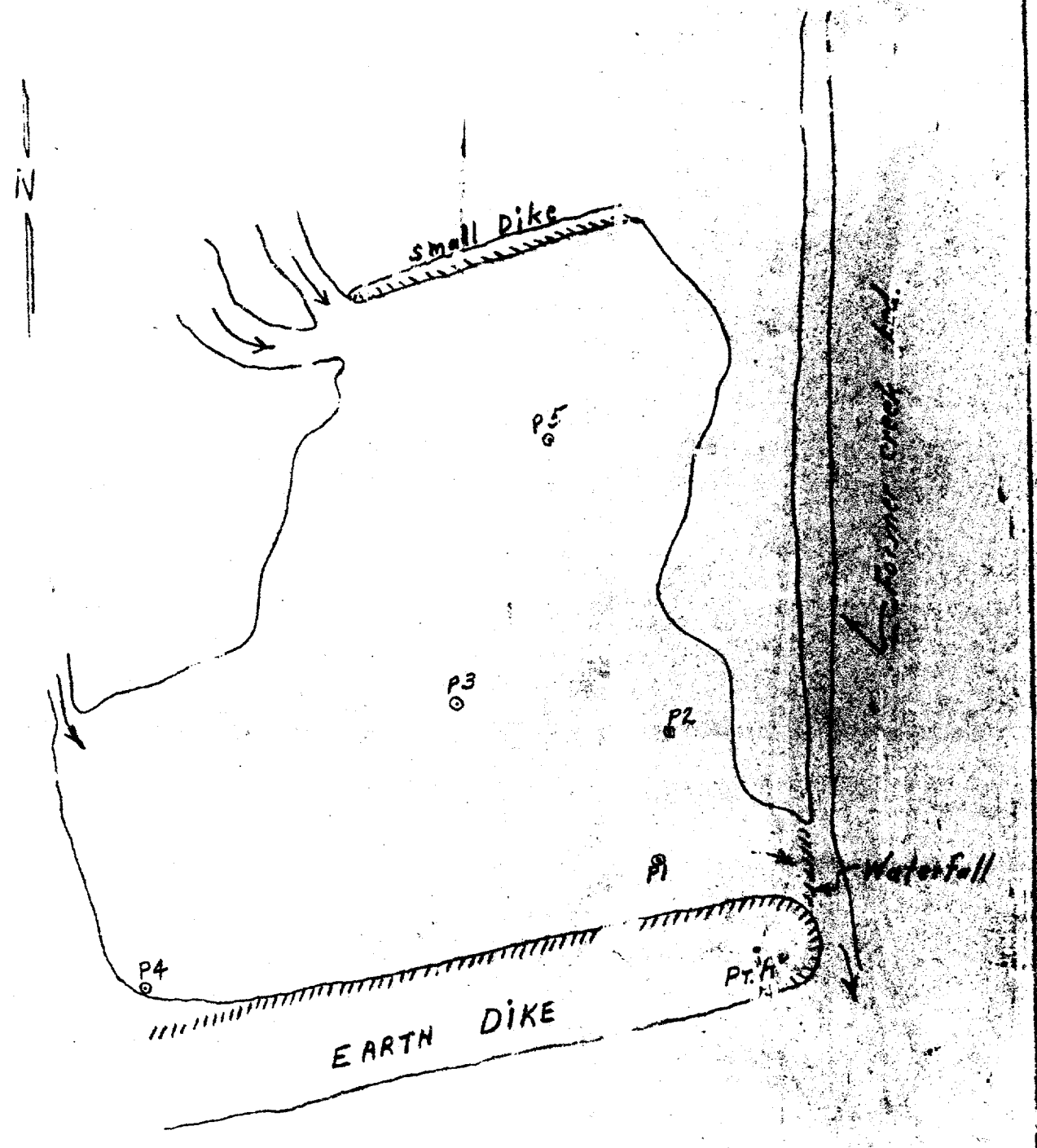
AREA (INCLUDING POND) : 11.9 ACRES

AREA (EXCLUDING POND) : 10.7 ACRES

DATE: 5-5-45 DRAWN BY: J. W. M.

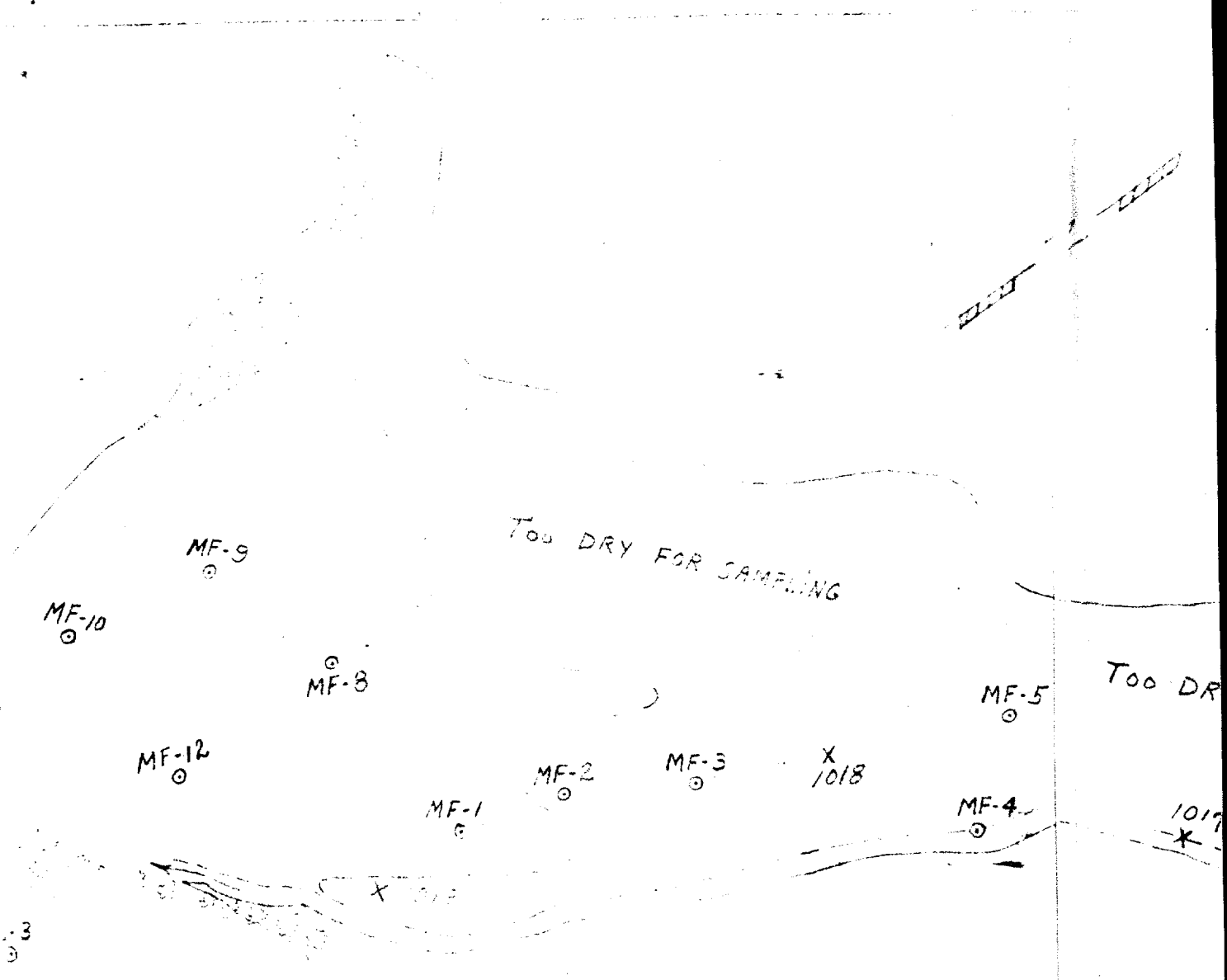
DATE: 9-18-46 REVISED BY: D. A. P.


White Oak Creek
MA-3
MA-1
MA-2
Upper dike
401-1
402
MA-4
403
MA-5
MA-6
404
MA-7
MA-8
405
MA-9
MA-10
Former stream bed
406
MA-11
N

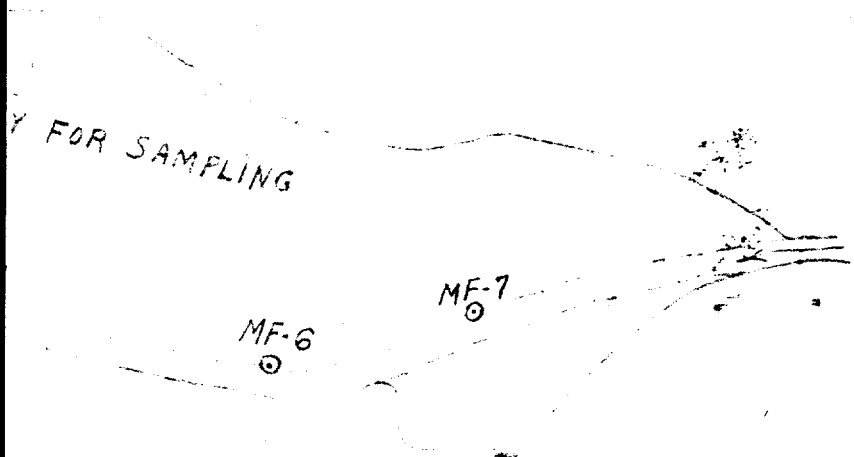


Pt. 1 is 52' From "A": bearing 324° Mag.
Pt. 2 is 92' from A: bearing 340°
Pt 3 is 150' from A: bearing 322°40'
Pt 4 is 235' from A: bearing 266°30'
Pt 5 is 210' from A: bearing 340°20'

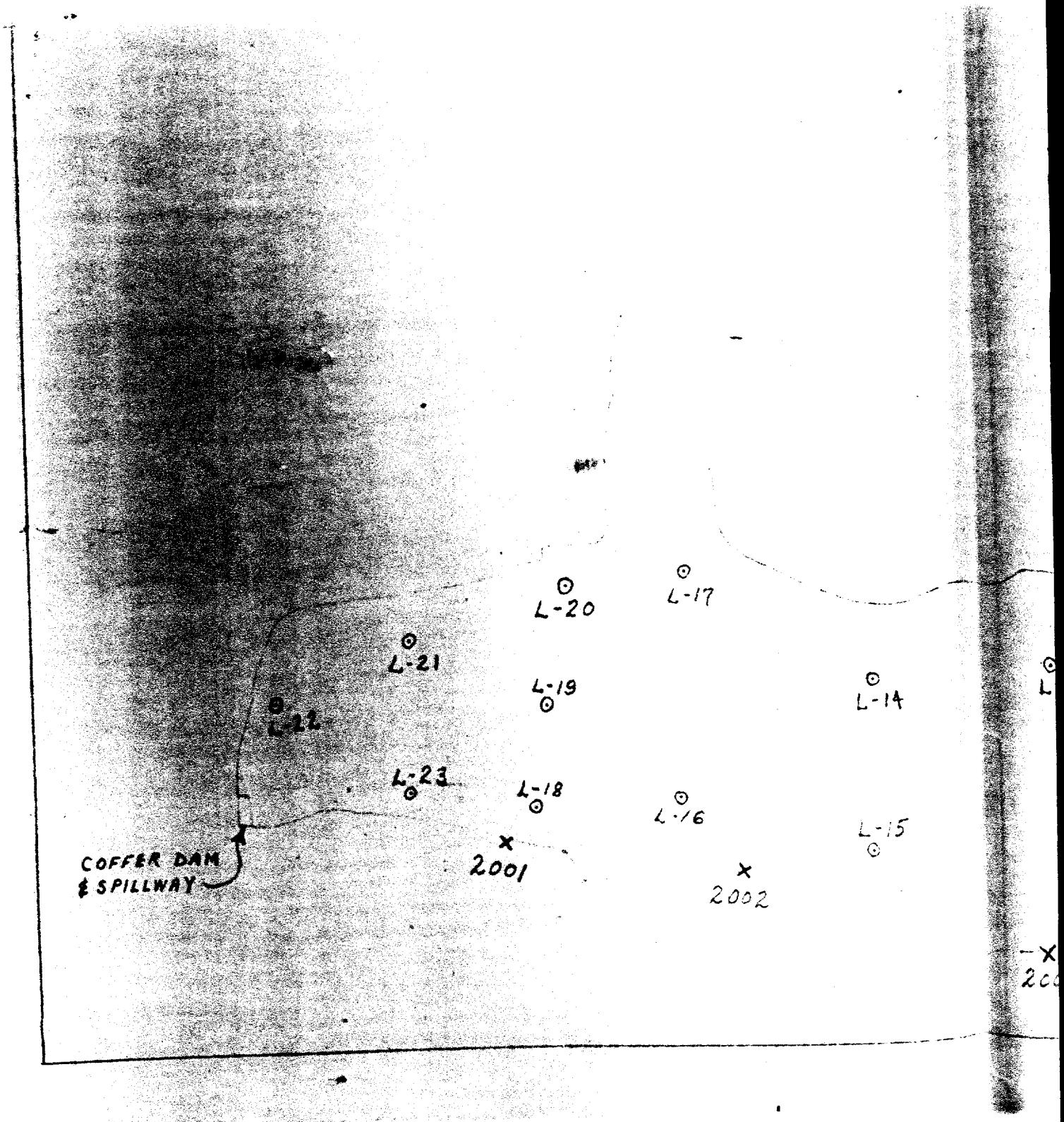
INTERMEDIATE POND
Scale: 1"=60' AREA = 1.2 acres
DRAWN BY: J.W.M.
REVISED BY: D.A.PARKER 9-13-7.

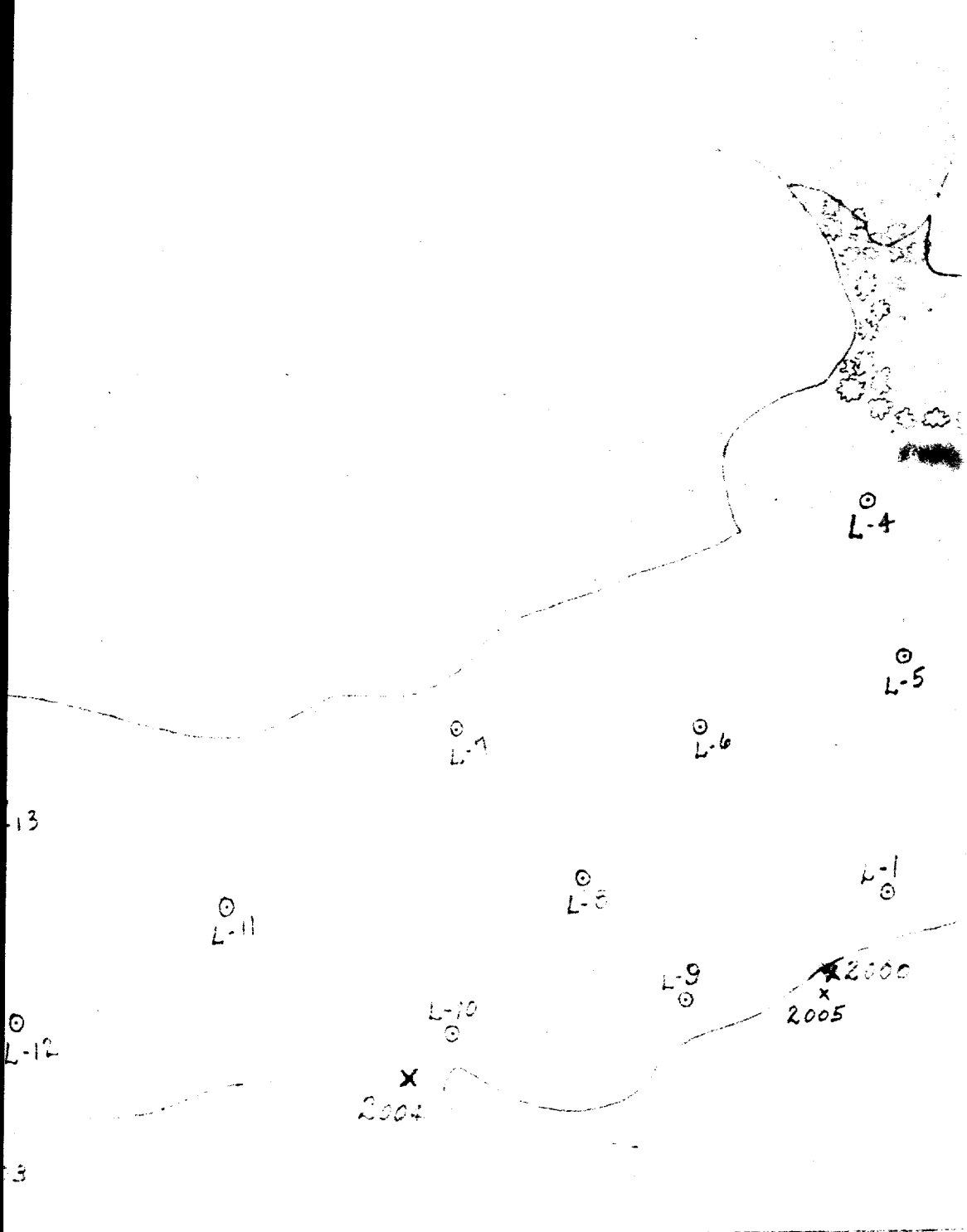

MF-9
TOO DRY FOR SAMPLING
MF-10
MF-8
MF-5
TOO DR
MF-12
MF-2
MF-3
X
1018
MF-1
MF-4
1017
X
3

DRAWING No. 1393
MAY 19, 1945



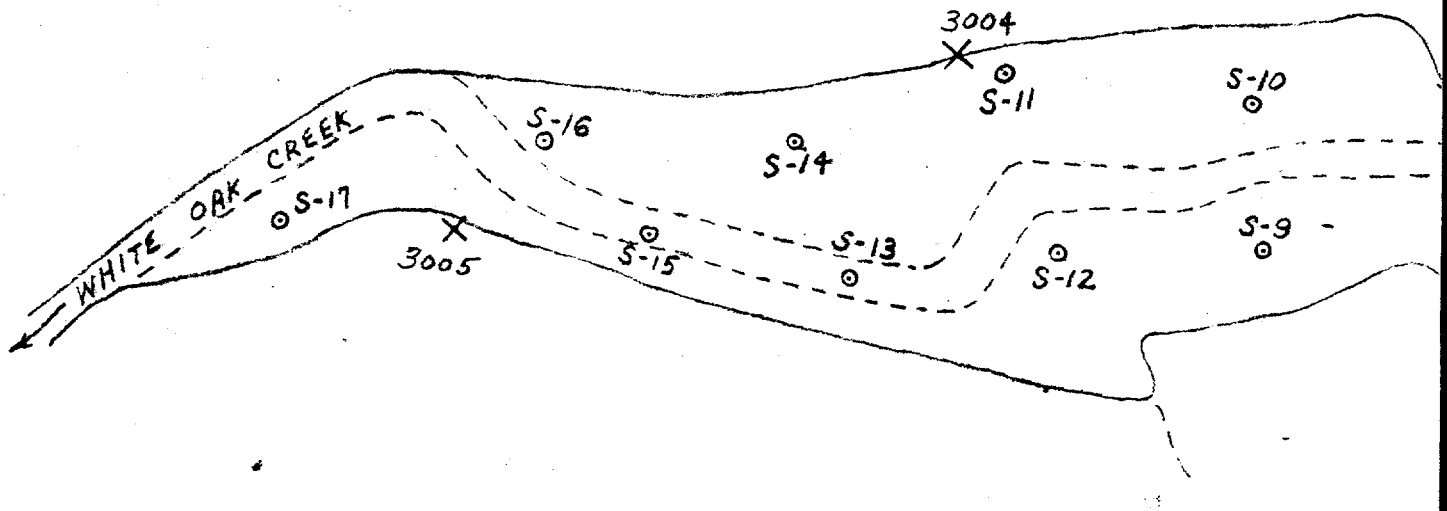
NOTE: SAMPLING POINTS SHOWN AS ⊙
CONTROL POINTS SHOWN AS X


L-20
L-17
L-21
L-19
L-14
L-22
L-23
L-18
L-16
L-15
2001
2002
COFFER DAM
& SPILLWAY

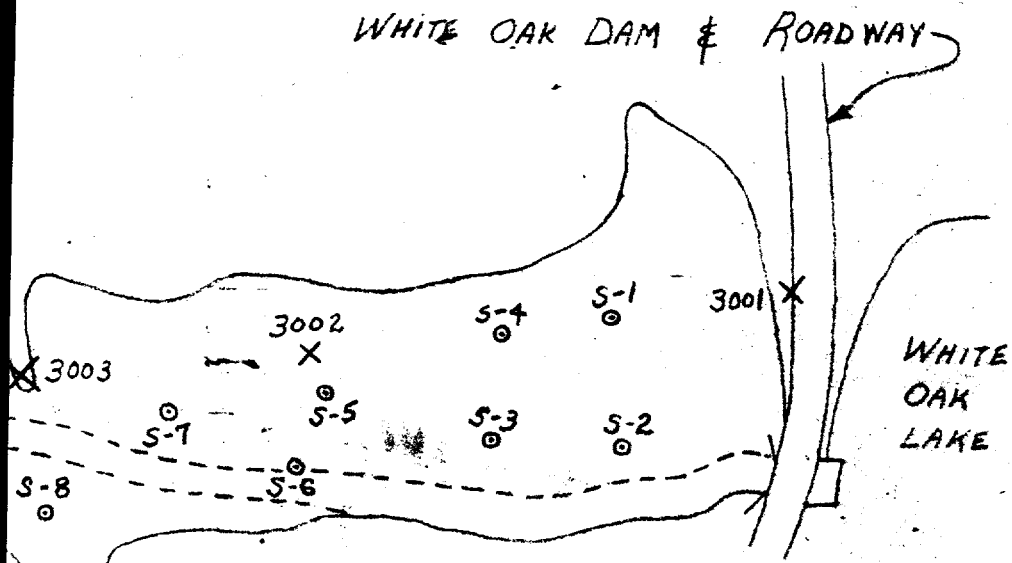

L-4
L-5
L-7
L-6
L-13
L-11
L-8
L-1
L-9
2000
2005
L-10
L-12
2004

~NOTE~

ALL BEARINGS TAKEN
FROM 0° MAG. NORTH.



DRAWING No. 1392
MAY 19, 1945



SAMPLING POINTS SHOWN AS: ⊙
CONTROL POINTS SHOWN AS: X

WHITE OAK DAM SPILLWAY AND WATTS